Bacterial Genetics

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outlines

- Genetic Information In Bacteria
- Nucleic Acids
- The chemical structure of DNA and RNA
- The function of DNA and RNA
- DNA replication
- Mechanisms Of Genetic Variations

Genetic Information In Bacteria

- Genetics is the study of heredity and variation.
- The unit of heredity is gene, which is a segment of DNA specifying for a particular polypeptide
- Most bacterial genes code for proteins but some genes are noncoding interposed sequences like those seen in eukaryotes.

Genetic Information In Bacteria

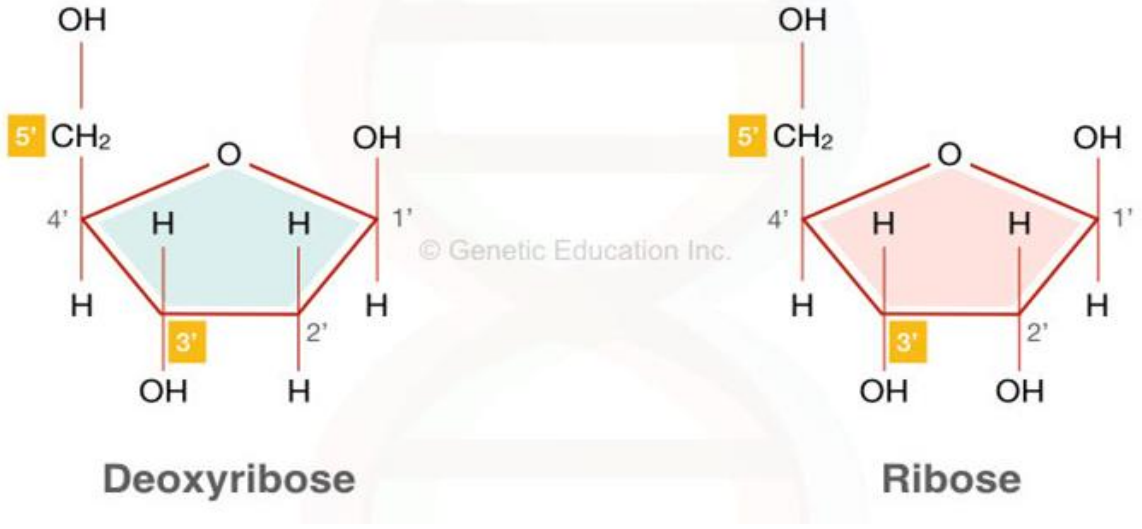
- Bacterial genetics is used as a model to understand DNA replication, genetic characters, their changes & transfer to next generations.
- Bacteria possess two main genetic structures: the chromosome and the plasmid.
- Both of these structures consist of a circular double stranded DNA molecule twisted about its helical axis.

Genetic Information In Bacteria

- Chromosome
- Plasmid: Extrachromosomal genetic material in the cytoplasm .
- Bacteriophage :Virus infecting bacteria

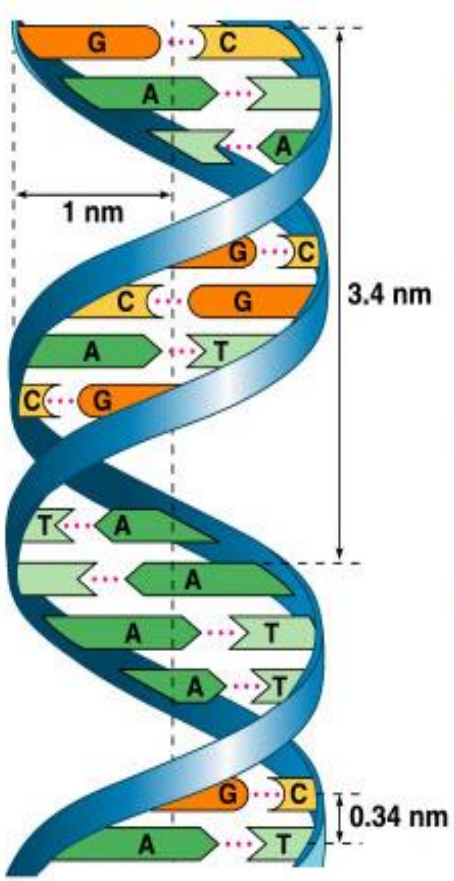
Nucleic Acids

- DNA (Deoxy Ribonucleic Acid) : Stores information for protein synthesis.
- RNA (ribonucleic acid) : Transcription & translation of information for protein synthesis.



The chemical structure of bacterial Nucleic acids (DNA and RNA)

- Nucleic acids are made up of basic units called nucleotides which bind together by covalent bonds to form a polynucleotide or the nucleic acid.



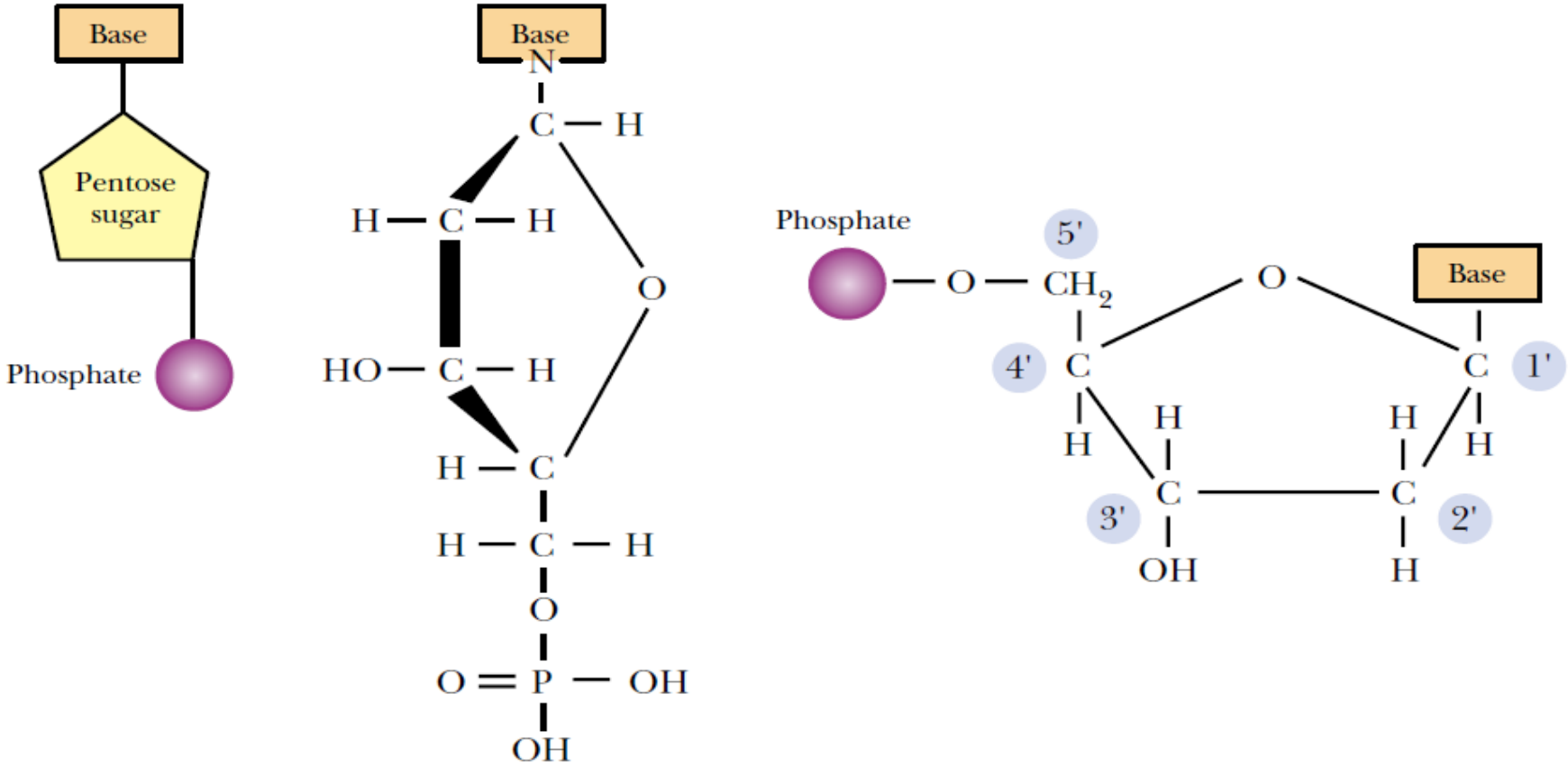
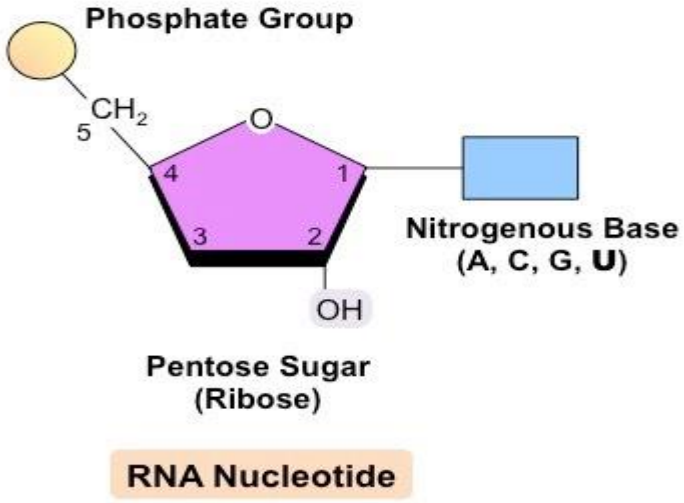
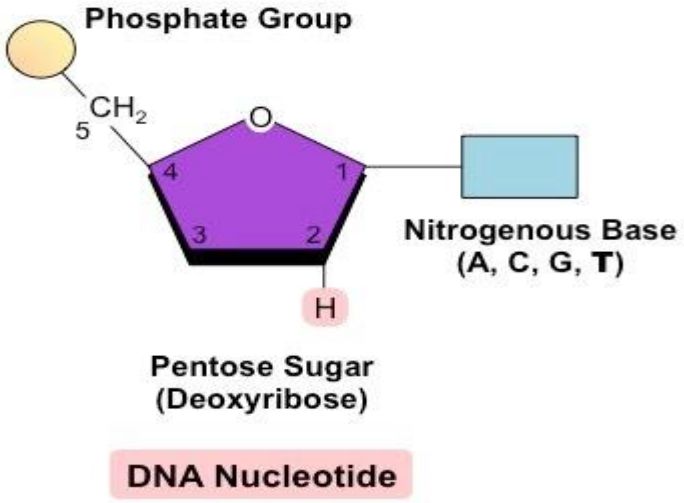


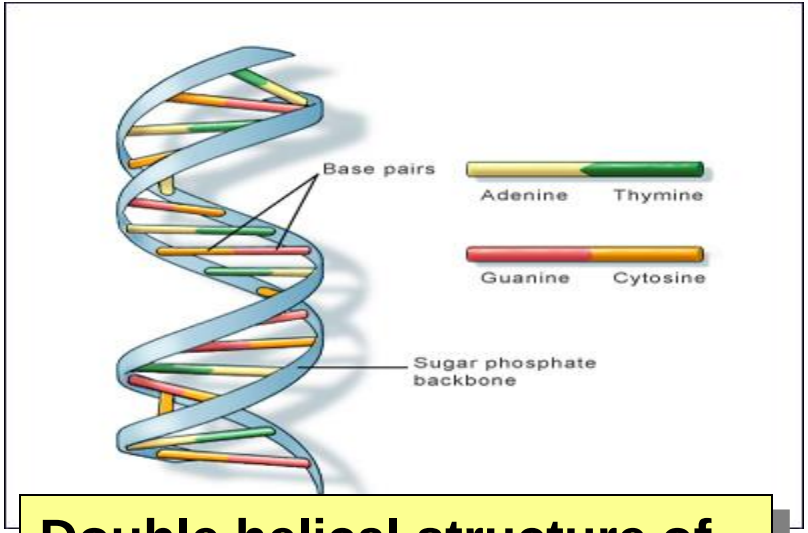
FIGURE 3.02 ***Three Views of a Nucleotide***

The chemical structure of bacterial Nucleic acids (DNA and RNA)

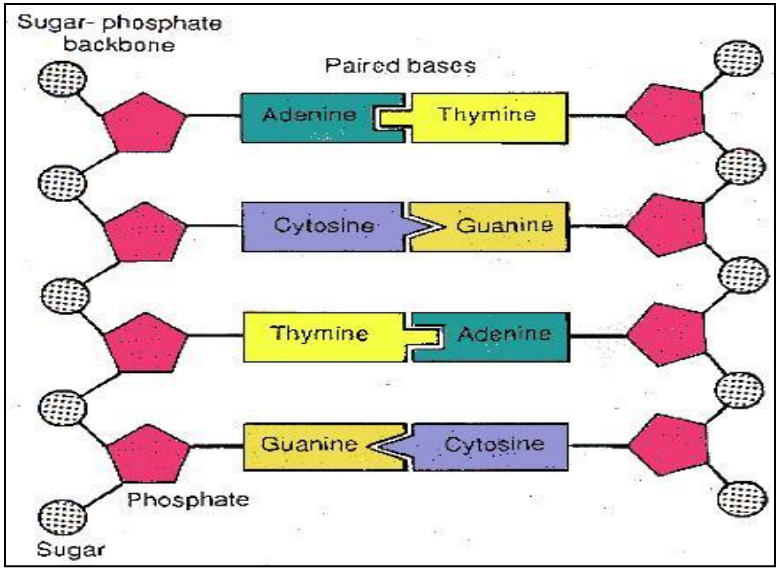
- DNA is composed of 2 chains of polypeptides, each chain has a backbone of deoxyribose sugar and phosphate residues with 4 nitrogenous bases:
- Adenine (A) Guanine (G) Thymine(T) Cytosine (C)







Double helical structure of DNA by Watson & Crick



Structure Of RNA

- Structurally similar to DNA, except for 2 major differences:
  - ribose sugar
  - uracil in place of thymine.

- 3 types of RNA
  - mRNA (messenger RNA)
  - tRNA (transfer RNA)
  - rRNA (ribosomal RNA)

The functions of DNA

- They are responsible for passing on the genetic traits from one generation to another when cells divide.
- DNA carries the genetic information responsible for creating the distinctive characteristics of the living organism and organizes all the vital activities of the cell.

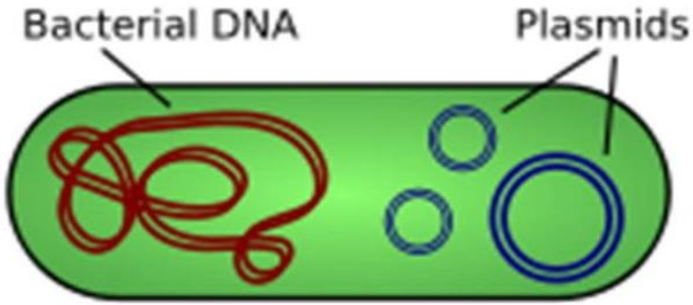
Functions of RNA

- Messenger RNA (mRNA): Carries genetic information copied from DNA in the form of a series of 3-base code, each of which specifies a particular amino acid.
- Transfer RNA (tRNA): It is the key that read the code on the mRNA.
- Ribosomal RNA (rRNA): Associated with a set of proteins to form the ribosomes.

Plasmids

- **Plasmids** are small, circular DNA molecules that contain the cell's nonessential genes.
- **Types of plasmids**

- Resistance Plasmids (R factors)
- Virulence Plasmids.
- Degradative Plasmids.
- Col Plasmids.
- Fertility F Plasmids (F factors)



Questions